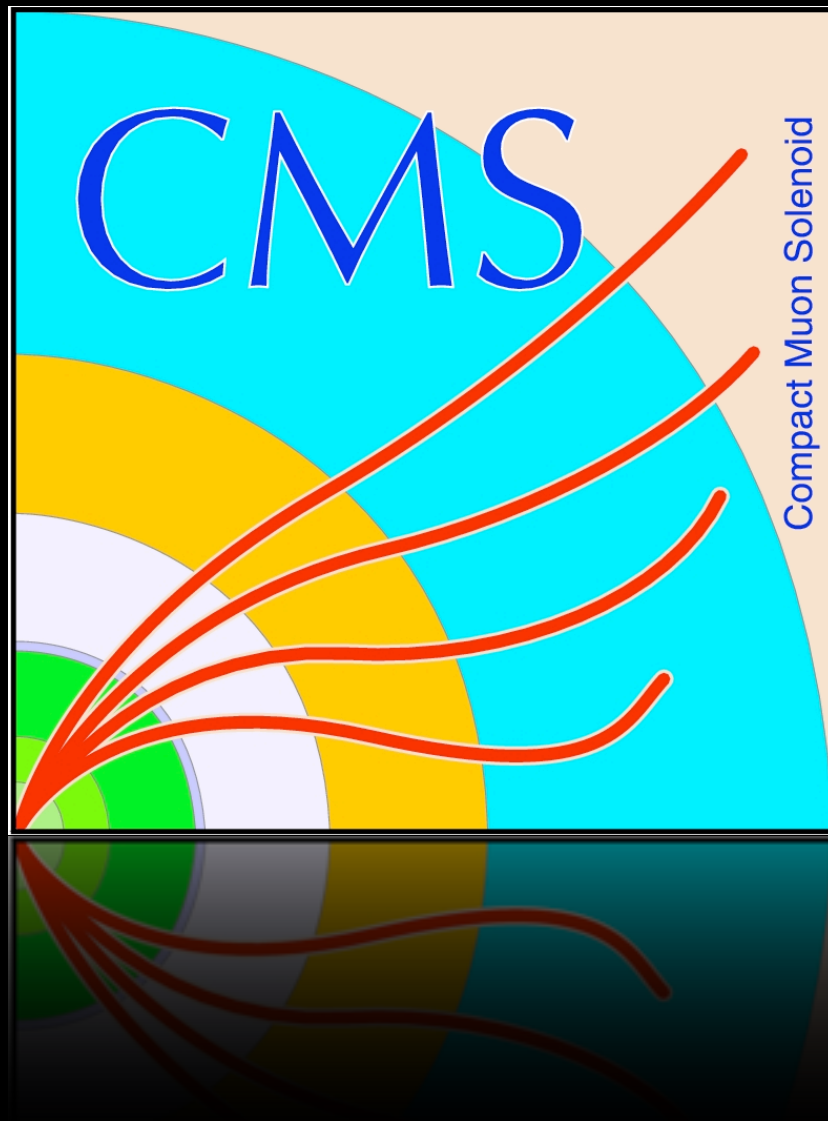


CMS Global Analysis



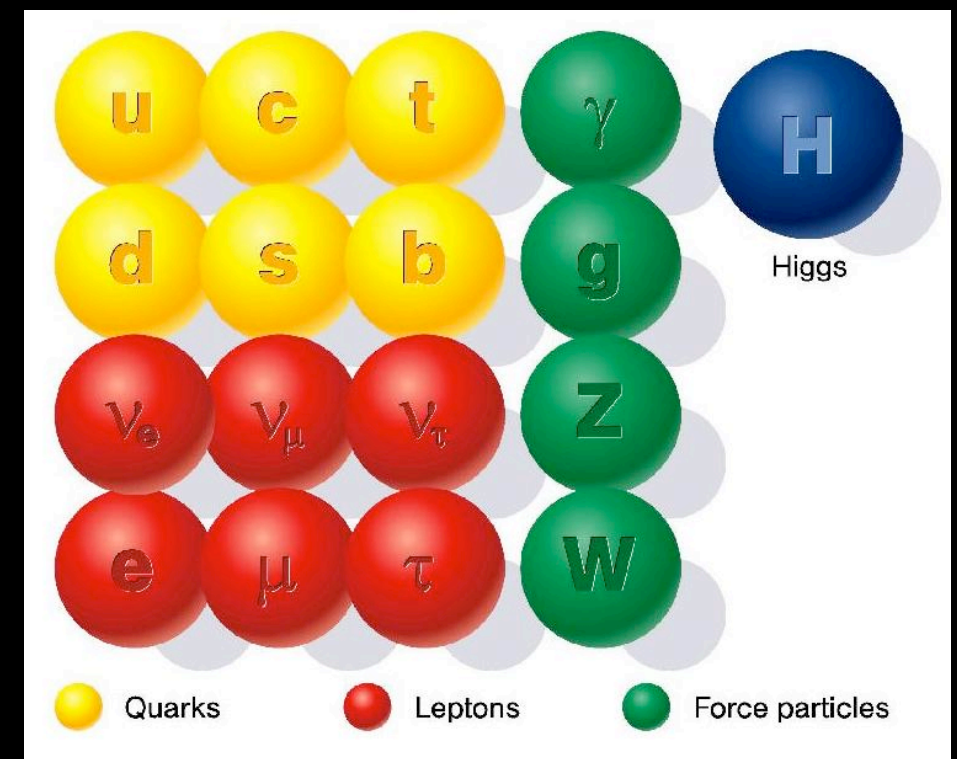
Oliver Gutsche - Fermi National Accelerator Laboratory

Particle Physics



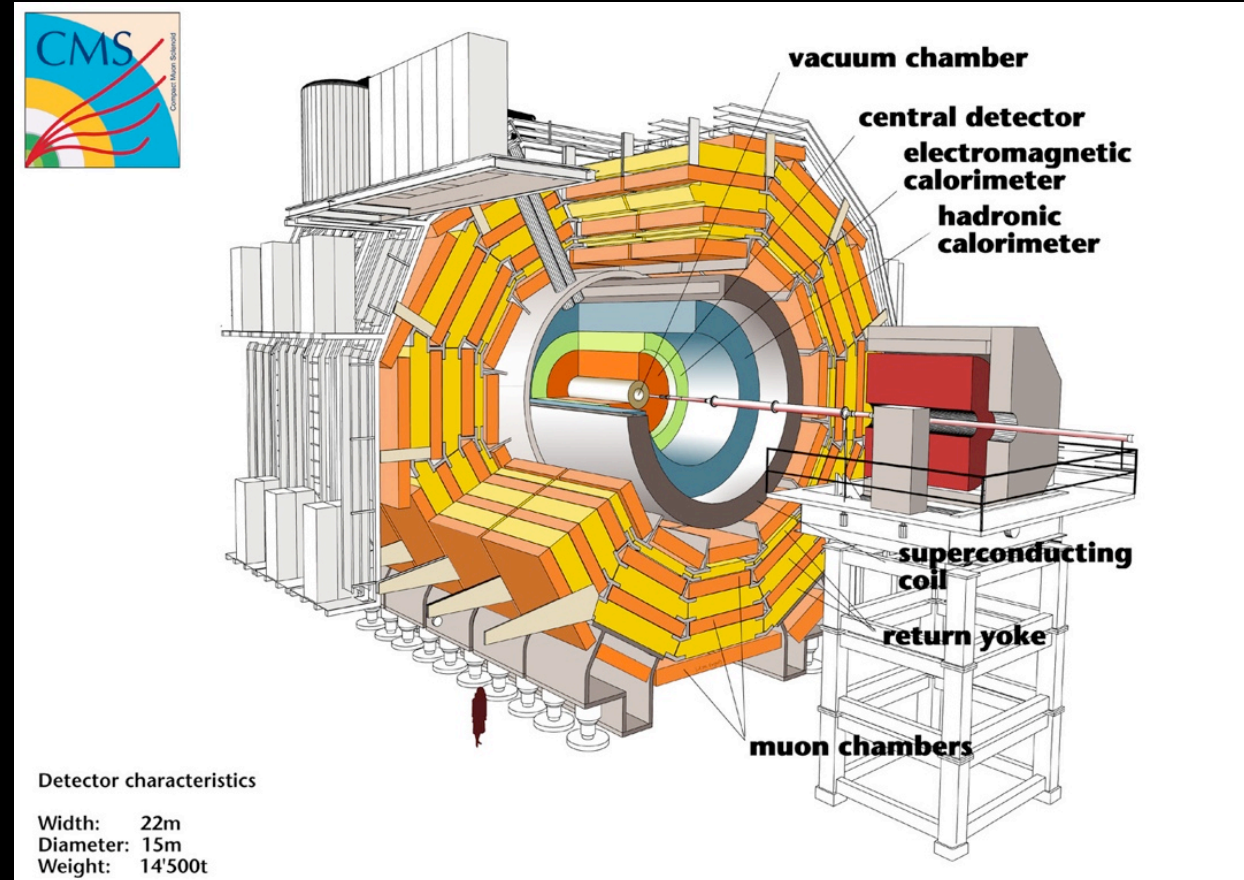
- Investigates the structure of matter by
 - Colliding elementary particles
 - Detecting collision products

- Describes structure of matter using mathematical concepts: **Standard Model**
- **Higgs**: concept to describe mass of particles
 - not discovered yet \Rightarrow LHC



LHC and CMS

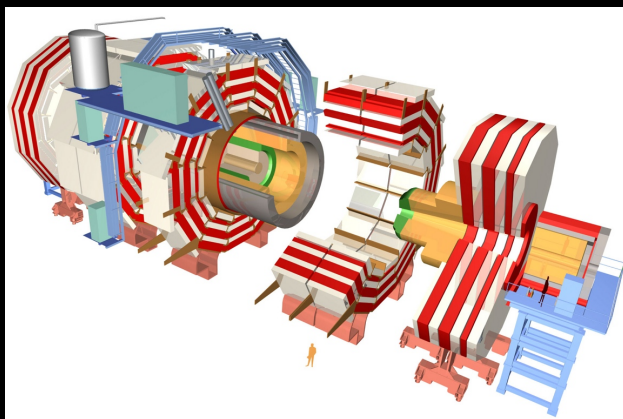
- **L**arge **H**adron **C**ollider at CERN, Geneva, Switzerland
- Proton-Proton collisions
- Beam energy: 7 Terra Electron Volts
- Circumference: 27 km



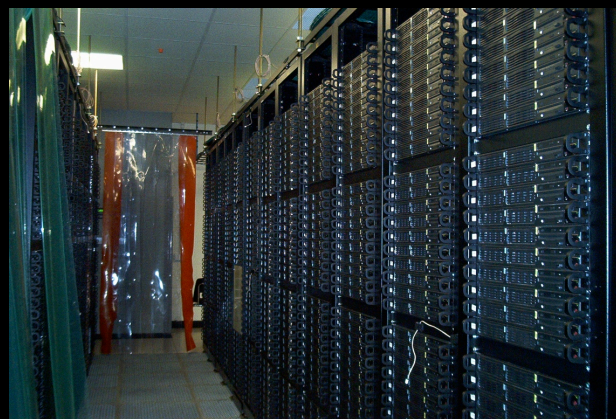
- **C**ompact **M**uon **S**olenoid:
 - One of 4 particle collision detectors at the LHC
 - Width: 22m, Diameter: 15m
 - Weight: 14,500 t

CMS Data Analysis

- Physicist investigate every collision individually to analyze its physics content
- 150 collisions per second are recorded by the detector
- Collisions are stored in form of events
- Events contain all detector and derived information
- Estimated number of recorded and simulated events
 - 2007: **300 million**
 - 2008: **3 billion**
- Peta-scale data volumes
 - 2007: **640 TeraByte**
 - 2008: **6400 TeraByte**



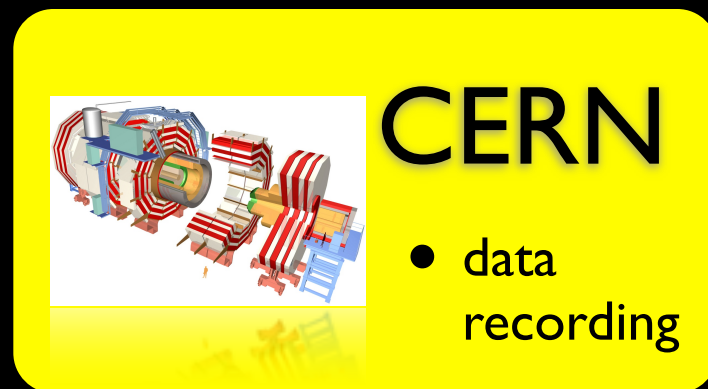
Data recording:
1.8 MB/ev.



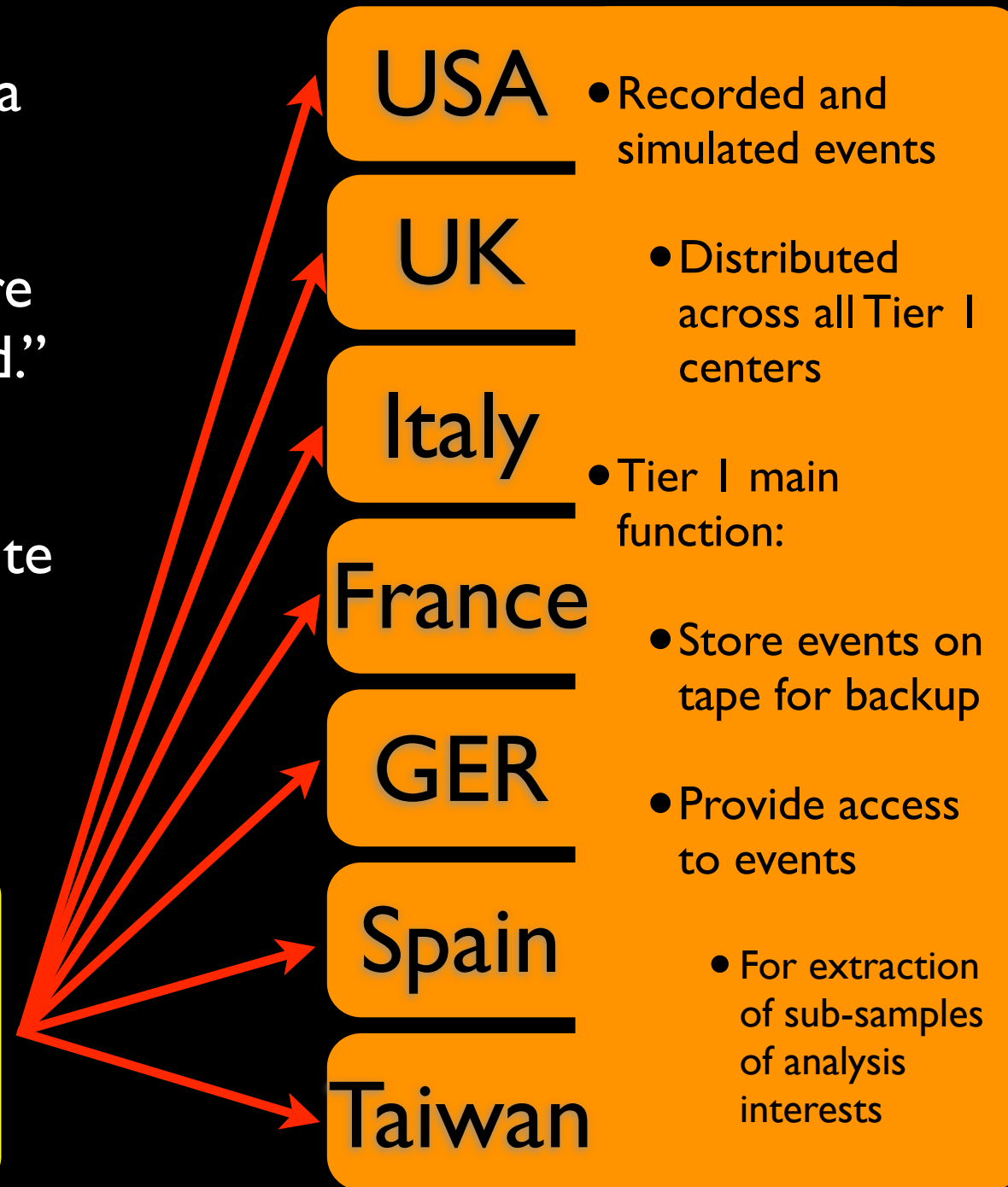
Simulation:
2.5 MB/ev.

CMS Tier Structure

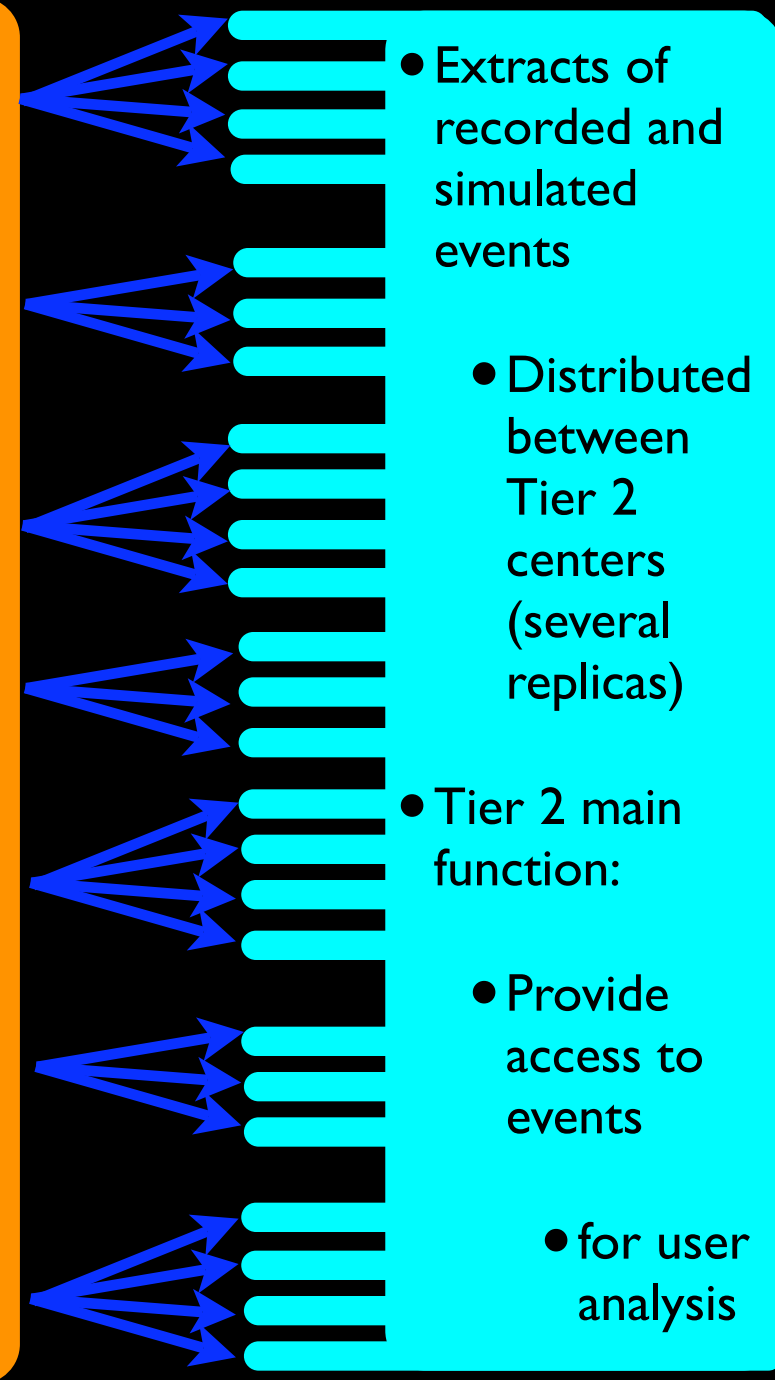
- Analysis of CMS data is location driven
 - “Job is sent where the data is stored.”
- CMS follows GRID approach to distribute data storage and processing world-wide



1 Tier 0



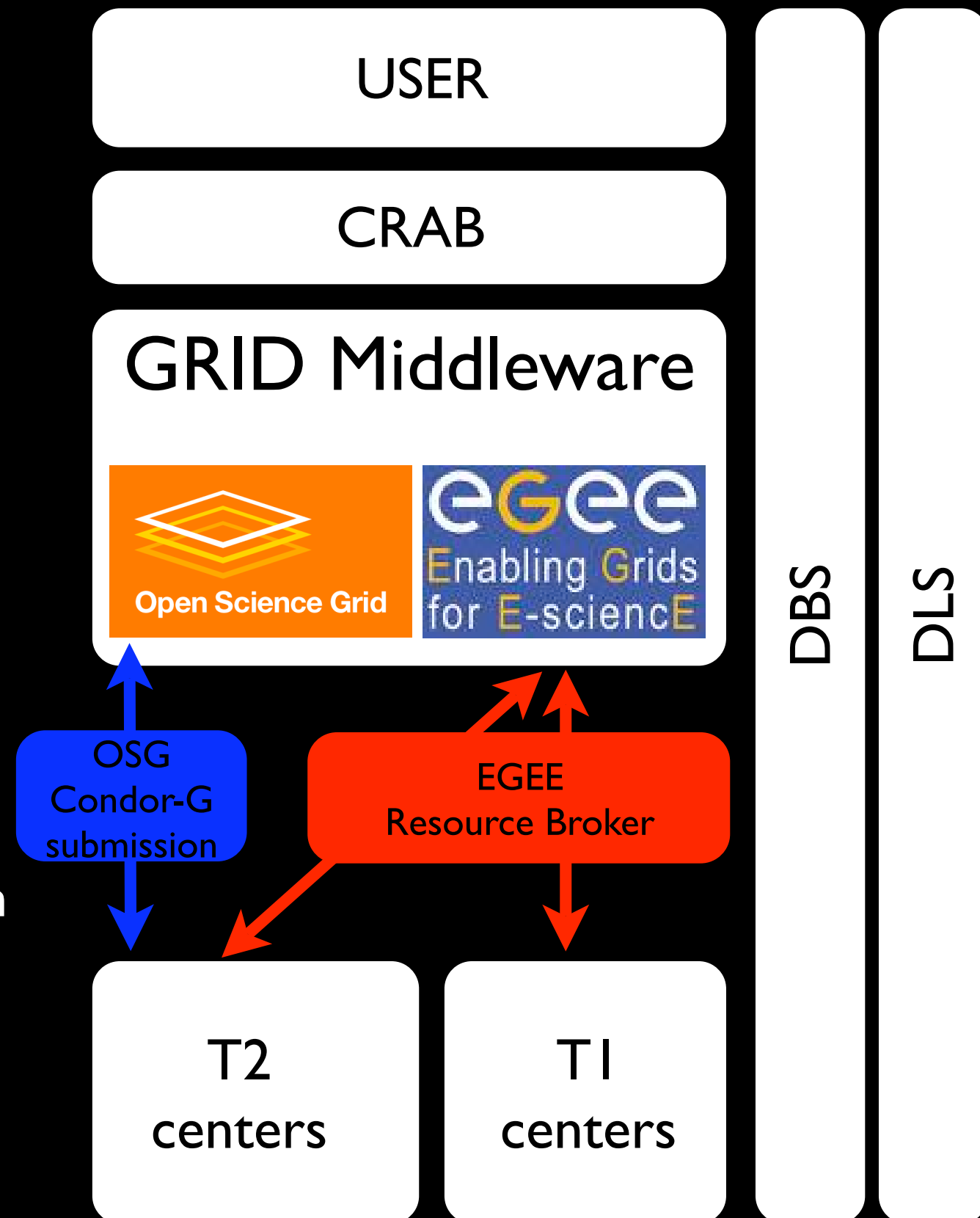
7 Tier 1



~25 Tier 2

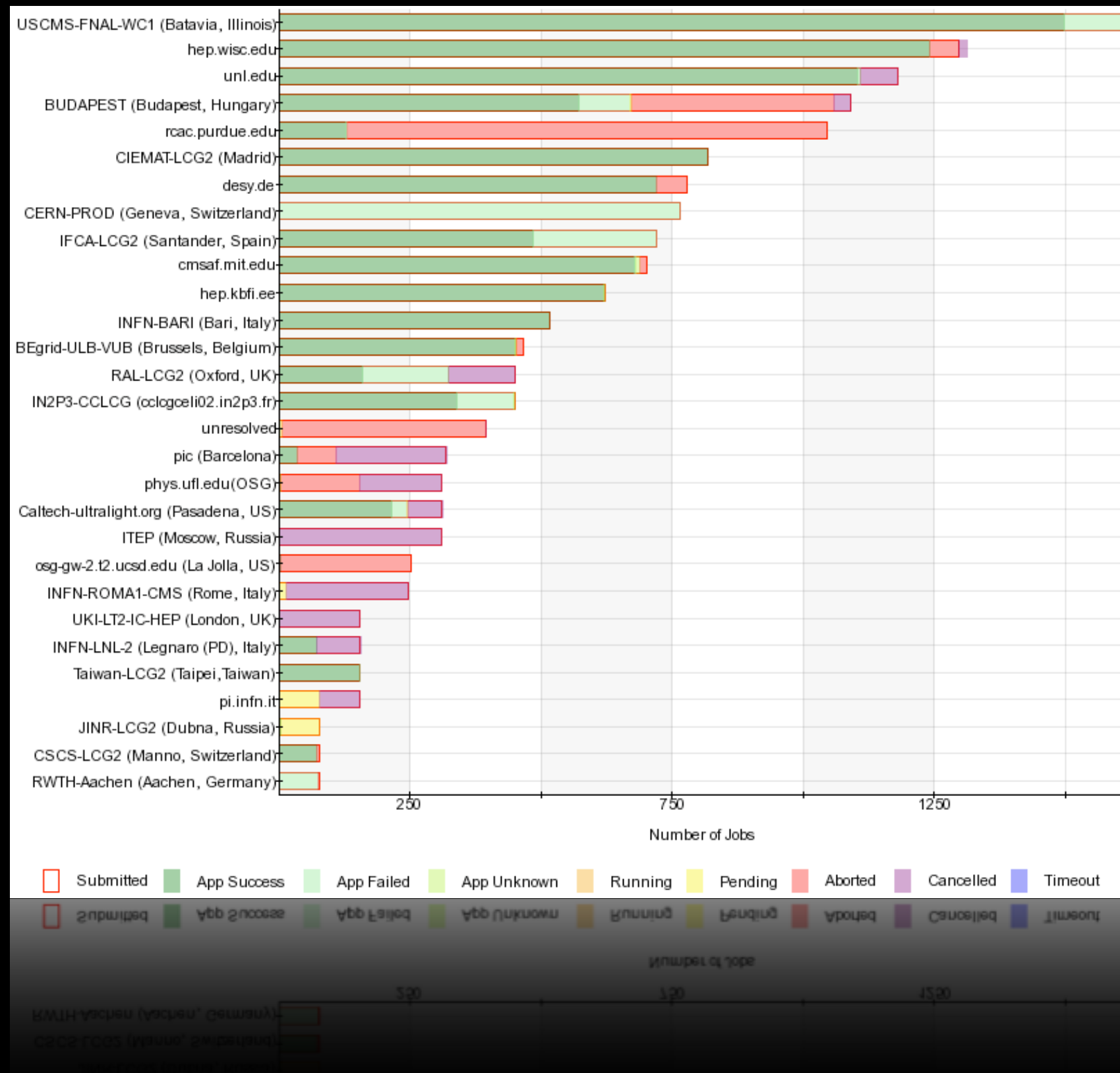
Global Data Access

- Equal fair share access for all CMS users
- User tool: **CMS Remote Analysis Builder**
- Global Data Discovery Services:
 - **Data Bookkeeping Service**
 - **Dataset Location Service**
- GRID submission:
 - EGEE resource broker submission to all centers
 - OSG Condor-G submission to OSG T2



Infrastructure Performance

- Automated test of analysis infrastructure
- Goal:
 - 12,500 analysis jobs per day
- Reached and sustained over days
- Shown example day: 15,529 jobs



Summary & Outlook

- CMS Global Analysis provides all CMS users with access to **peta-scale** data volumes
 - distributed world-wide
 - accessible via GRID structure
- Infrastructure achieves current performance goals

